

Errata (Prepared November 2000)

for

Engineered Approaches to *In Situ* Bioremediation of Chlorinated Solvents:

Fundamentals and Field Applications

EPA 542-R-00-008

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The following changes are made:

1. On page i, the following sentence is added to the end of the first paragraph of the Notice and Disclaimer section: "For technical questions concerning *in situ* bioremediation, please contact: Ann Azadpour-Keeley, U.S. Environmental Protection Agency, Office of Research and Development, National Risk Management Research Laboratory, Subsurface Protection and Remediation Division, P.O. Box # 1198, Ada, Oklahoma, 74820; (580) 436-8890; e-mail: keeley.ann@epa.gov."
2. On page i, the Acknowledgments section is revised to read, "Special acknowledgment is given to the following individuals for their thoughtful suggestions and support in preparing this report: Lewis Semprini, Oregon State University; David Steckel, Edwards Air Force Base; Perry McCarty, Stanford University; Edward Bouwer, The Johns Hopkins University; Kurt Gerdes, the U.S. Department of Energy; David W. Anderson and Susan Litherland, Roy F. Weston, Inc.; Daniel L. Jacobs, ARCADIS Geraghty & Miller; Willard Murray, Harding Lawson Associates; Mick Mikula, Dover Air Force Base; and David Ellis, E.I. du Pont de Nemours and Company."
3. On page vi, the definition for "abiotic" is revised to read, "Nonbiological process; also used to refer to nonbiological degradation processes."
4. On page vi, the definition for "aerobic" is revised to read, "Condition in which oxygen is present; also used to refer to a type of microbe that requires oxygen to live and reproduce."
5. On page vi, the definition for "anaerobic" is revised to read, "Condition in which no oxygen is present; also used to refer to a type of microbe that is able to live and reproduce in the absence of oxygen."
6. On page vii, the definition of "confining layer" is revised to read, "Impermeable layer (such as clay) that impedes the vertical migration of groundwater or NAPL."
7. On page vii, the definition for "electron acceptor" is revised to read, "A compound capable of accepting electrons during oxidation-reduction reactions. Microorganisms obtain energy by transferring electrons from electron donors, such as organic compounds (or sometimes reduced inorganic compounds, such as sulfide), to an electron acceptor. Electron acceptors are compounds that are reduced during the process and include oxygen; nitrate; iron (III); manganese (IV); sulfate; carbon dioxide; or, in some cases, chlorinated aliphatic hydrocarbons, such as carbon tetrachloride, PCE, TCE, DCE, and VC."
8. On page viii, the definition for "electron donor" is revised to read, "A compound capable of supplying (giving up) electrons during oxidation-reduction reactions. Microorganisms obtain energy by transferring electrons from electron donors, such as organic compounds (or sometimes reduced inorganic compounds, such as sulfide), to an electron acceptor. Electron donors are compounds that are oxidized during the process and include fuel hydrocarbons and native organic carbon."

9. On page 2-7, the fourth sentence of the third paragraph is revised to read, "Ecology involves the different types of bacteria electron acceptor classes, such as oxygen-, nitrate-, manganese-, iron (III)-, sulfate-, or carbon dioxide-reducing, and their corresponding redox potentials."
10. Exhibit 2-7 on page 2-9 is revised to show the redox zones in the following order (from left to right, or from contaminant source to leading edge of plume): Contaminant Source Zone, Methanogenic Zone, Sulfate Reducing Zone, Iron (III) Reducing Zone, Nitrate & Manganese (IV) Reducing Zone, and Oxygen Reducing (Aerobic) Zone.
11. On page 2-13, the second sentence of the second paragraph is revised to read, "Electrons that are generated by the oxidation of the compounds are transferred to an electron acceptor such as oxygen."
12. On page 2-17, the second sentence of the third paragraph is revised to read, "In the upgradient anaerobic zone, anaerobic reductive dechlorination of PCE might degrade to TCE, and eventually to VC. VC could then be degraded by aerobic oxidation (direct) downgradient in the aerobic zone of the CAH plume (the leading-edge fringe of the plume)."
13. On page 4-7, the first sentence of the first paragraph is revised to read, "For direct aerobic oxidation, primary reactants include oxygen and CAH and possible additives include air, oxygen, hydrogen peroxide (H_2O_2) and magnesium peroxide."
14. Exhibit 4-5 on page 4-7 is revised to list air, oxygen, hydrogen peroxide, and magnesium peroxide as typical additives for aerobic oxidation (direct) and for aerobic oxidation (cometabolic) where oxygen is the primary reactant."